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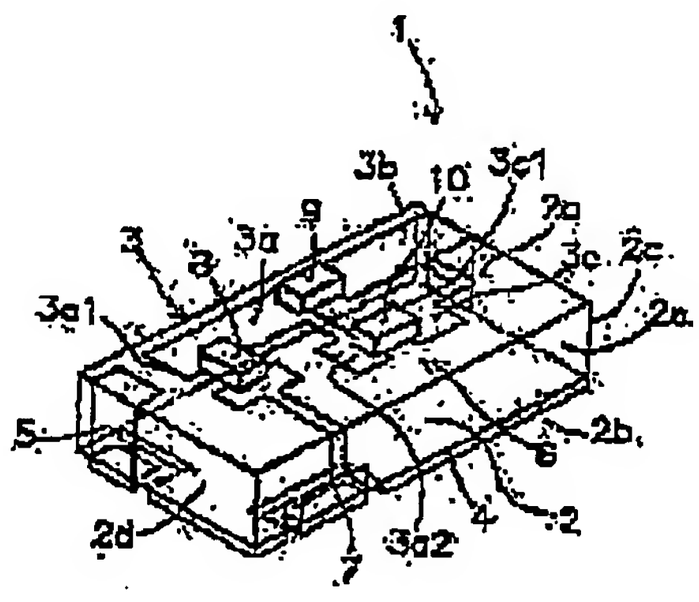
(54) SURFACE MOUNTING ANTENNA

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a surface mounting antenna by which plural resonance frequencies are obtained.
SOLUTION: A surface mounting antenna 1 is provided with a frequency switching means 6 with a diode 9. Plural resonance frequencies are achieved by turning the diode 9 on/off by adjusting a voltage to be impressed on the frequency switching means 6 and adjusting an inductance component by turning conductive all of first to third tracks 3a, 3b, 3c to constitute a radiation electrode 3 or turning only two of the tracks conductive.



CLAIMS

[Claim(s)]
[Claim 1]Have a radiation electrode, an earth electrode, and a feed electrode which are provided in the surface of a base which consists of a dielectric or a magnetic body, and this base, one end of said radiation electrode forms an open end, and it is connected to said earth electrode by the other end, and An open end of said radiation electrode, A surface mounted type antenna establishing a frequency means for switching for an end of said feed electrode to change an inductance component or a capacity component, and switch resonance frequency on the surface of said base in a surface mounted type antenna which it comes to arrange by approaching mutually.
[Claim 2]The 1st track where said radiation electrode consists of a microstrip line of said base provided in the principal surface on the other hand, Comprise the 2nd track and the 3rd track, and an end of said 1st track forms an open end, and an end of said 2nd track, It is arranged near the other end of said 1st track, and said 3rd track, It is formed in one succeeding said 2nd track, and said earth electrode, It is provided in the another side principal surface of said base, and said frequency means for switching. The surface mounted type antenna according to claim 1 provided with a semiconductor device which consists of a chip connected to the other end of said 1st track, and one end of said 2nd track, and a switching electrode for switching and impressing voltage of a predetermined field to this semiconductor device.
[Claim 3]Said radiation electrode consists of striplines and said earth electrode, Approach an open end of said radiation electrode, and consist of the 1st earth electrode and 2nd earth electrode that are mutually formed in a different body, and an end of said 1st earth electrode is arranged, and said 2nd earth electrode, It is formed in one succeeding said some of radiation electrodes, and said frequency means for switching. The surface mounted type antenna according to claim 1 provided with a variable capacity element which consists of a chip connected to an open end of said 1st earth electrode and said radiation electrode, and a switching electrode for switching and impressing voltage of a predetermined field to this variable capacity element.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates to mobile communications equipment, such as a cellular phone, and the surface mounted type antenna used for wireless LAN.
[0002]
[Description of the Prior Art]As a conventional surface mounted type antenna, what was indicated by JP,H9-98015,A is taken for an example, and the composition is explained using drawing 9.
[0003]In drawing 9, 41 is a surface mounted type antenna and it comes to form the radiation electrode 43, the earth electrode 44, and the feed electrode 45 which consist of microstrip lines in the surface of the base 42 which consists of a dielectric or a magnetic body. Here, one end of the radiation electrode 43 is connected to the earth electrode 44 of the base 42 which, on the other hand, formed the open end 43a in the principal surface 42a, and the other end was prolonged in the another side principal surface 42b of the base 42, and was formed in the field. In the one side principal surface 42a of the base 42, the end of the feed electrode 45 approaches the open end 43a of the radiation electrode 43, and is arranged. The other end of the feed electrode 45 is prolonged in the another side principal surface 42b of the base 42, and is electrically insulated from the earth electrode 44 by being arranged via the base of the base 42 to the earth electrode 44. Next, operation of the surface mounted type antenna 41 constituted in this way is explained using drawing 10.
[0004]In drawing 10, the capacity which generates f1 in a high frequency signal source, and generates C10 between the open end 43a of the radiation electrode 43 and the feed electrode 45, the microstrip line from which L6 constitutes the radiation electrode 43, and R3 are radiation resistance. Here, with the capacity C10, electromagnetic field coupling of the high frequency signal impressed to the feed electrode 45 from the high frequency signal source f1 is carried out to the radiation electrode 43. it serves as an electric wave, and is emitted.
[0005]
[Problem(s) to be Solved by the Invention]However, in the conventional surface mounted type antenna 41, since resonance frequency was specified mainly with the linear dimension and width dimension of the dielectric constant of the dielectric or magnetic body which constitutes the base 42, and the radiation electrode 43, there was a problem that two or more resonance frequency was not obtained.
[0006]Then, it aims at providing the surface mounted type antenna with which two or more resonance frequency is obtained in this invention.
[0007]
[Means for Solving the Problem]In [in order to attain the above-mentioned purpose] this invention, Have a radiation electrode, an earth electrode, and a feed electrode which are provided in the surface of a base which consists of a dielectric or a magnetic body, and this base, one end of said radiation electrode forms an open end, and it is connected to said earth electrode by the other end, and An open end of said radiation electrode, A frequency means for switching for an end of said feed electrode to change an inductance component or a capacity component, and switch resonance frequency on the surface of said base, in a surface mounted type antenna which it comes to arrange by approaching mutually, was established.
[0008]Said radiation electrode comprises the 1st track, the 2nd track, and the 3rd track where said base this

invention consists of a microstrip line provided in the principal surface on the other hand, an end of said 1st track forms an open end, and it is characterized by an end of said 2nd track comprising the following.
It is arranged near the other end of said 1st track, and said 3rd track, A semiconductor device which it is formed in one succeeding said 2nd track, said earth electrode is provided in the another side principal surface of said base, and said frequency means for switching becomes from a chip connected to the other end of said 1st track, and one end of said 2nd track.
A switching electrode for switching and impressing voltage of a predetermined field to this semiconductor device.

[0009]Said radiation electrode consists of striplines and said earth electrode. The 1st this invention mutually formed in a different body consists of an earth electrode and the 2nd earth electrode. an end of said 1st earth electrode approaches an open end of said radiation electrode, and is arranged, and it is characterized by said 2nd earth electrode comprising the following.
A variable capacity element which it is formed in one succeeding said some of radiation electrodes. and said frequency means for switching becomes from a chip connected to an open end of said 1st earth electrode and said radiation electrode.
A switching electrode for switching and impressing voltage of a predetermined field to this variable capacity element.

[0010]A semiconductor device can be made to turn on and off in a surface mounted type antenna concerning this invention by switching voltage of a predetermined field and being impressed by a semiconductor device from the exterior, via a switching electrode which constitutes a frequency means for switching. And at the time of OFF of a semiconductor device, the 1st thru/or the 3rd track which constitutes a radiation electrode will flow mutually, and only the 1st and 2nd tracks will flow mutually at the time of one of a semiconductor device. Thus, by switching OFF/OFF of a semiconductor device, a linear dimension of a portion actually used among radiation electrodes can be changed, and an inductance component which specifies resonance frequency of an antenna can be adjusted. Thereby, two or more resonance frequency is realizable.
[0011]In a surface mounted type antenna concerning this invention, capacity of a variable capacity element can be changed from the exterior by switching voltage of a predetermined field and being impressed by a variable capacity element via a switching electrode which constitutes a frequency means for switching. A capacity component which specifies resonance frequency of an antenna can be changed by this, and two or more resonance frequency can be realized.
[0012]In a surface mounted type antenna concerning this invention, since a frequency means for switching is established on the surface of a base, the surface mounted type antenna does not need to establish a frequency means for switching of a different body, and contributes it to a miniaturization of the whole device provided with a surface mounted type antenna.
[0013]
[Embodiment of the Invention]The composition of the surface mounted type antenna concerning the 1st working example of this invention is explained using drawing 1.
[0014]In drawing 1, 1 is a surface mounted type antenna and forms the radiation electrode 3, the earth electrode 4, the feed electrode 5, and the frequency means for switching 6 in the surface of the base 2 which fabricates dielectrics, such as Ceramics Sub-Division and resin, to rectangular parallelepiped shape. The base 2 may consist of a magnetic body instead of a dielectric.
[0015]Here, the radiation electrode 3 comprises the 1st track 3a, the 2nd track 3b, and the 3rd track 3c which consist of a microstrip line of the base 2 mutually formed in a different body on the other hand in the principal surface 2a. Among these, one end of the 1st track 3a forms the open end three a1, and the extended part three a2 of the base 2 prolonged in the approximately center of the principal surface 2a on the other hand is formed in the other end. The 2nd track 3b is arranged on extension of the 1st track 3a, and one end is close to the other end of the 1st track 3a. The other end of the 2nd track 3b is prolonged in another side principal surface 2b via the end face 2c of the base 2. The 3rd track 3c has the extended part 3c1, and is formed in the 2nd track 3b and one in succession near the end of the 2nd track 3b via this extended part 3c1.

[0016]The earth electrode 4 is formed all over almost [of another side principal surface 2b of the base 2], and is formed in the 2nd track 3b and one succeeding the other end of the 2nd track 3b of the radiation electrode 3.
[0017]The feed electrode 5 covers the one side principal surface 2a, 2d of end faces, and another side principal surface 2b of the base 2, and is formed in roughly U-shape. The end of the feed electrode 5 is close to the open end three a1 of the radiation electrode 3 in the one side principal surface 2a of the base 2. The other end is electrically insulated from the earth electrode 4 by being arranged via the base of the base 2 to the earth electrode 4 in another side principal surface 2b of the base 2.
[0018]The frequency means for switching 6 consists of the switching electrode 7, the resistance 8 for chalk, the diode 9 as a semiconductor device, and the capacitor 10 for a bypass. Among these, the resistance 8, the diode 9, and the capacitor 10 consist of chips, respectively. Elements, such as a transistor or FET, may be used as a semiconductor device in addition to a diode.
[0019]Here, the switching electrode 7 is electrically insulated from the earth electrode 4 by [of the base 2] resulting in another side principal surface 2b via the side 2e of the base 2, and on the other hand, being arranged via the base of the base 2 to the earth electrode 4 from about three a1 open end of the radiation electrode 3 on the principal surface 2a. The resistance 8 has been arranged between the switching electrodes 7 the open end three a1 side of the 1st track 3a of the radiation electrode 3, and has connected the 1st track 3a and switching electrode 7. The diode 9 has been arranged between the 1st and 2nd track 3a that constitutes the radiation electrode 3, and 3b, and has connected these two tracks. The capacitor 10 has been arranged between the extended part three a2 of the 1st track 3a, and the 3rd track 3c, and has connected these two tracks.
[0020]It is mounted in a circuit wiring board, the switching electrode 7 is connected to the voltage control mechanism of a set side, and especially the surface mounted type antenna 1 constituted in this way is used, although not illustrated.
[0021]Next, operation of the surface mounted type antenna 1 is explained using drawing 2.
[0022]In drawing 2, f is a high frequency signal source and the capacity which generates C1 between the open end three a1 of the radiation electrode 3 and the feed electrode 5, the capacity which generates C2 between the earth electrode 4 and the feed electrode 5, and C3 are capacity generated between the open end three a1 of the 1st track 3a of the radiation electrode 3, and the earth electrode 4. R1 is resistance by the resistance 8, and C4 is the capacity by the capacitor for a bypass (not shown) formed on the circuit wiring board in which the surface mounted type antenna 1 is mounted. L1, L2, and L3 are microstrip lines which constitute the 1st thru/or the 3rd track 3a, 3b, and 3c, respectively, and C5 is the capacity by the capacitor 10. The 3rd track 3c is connected between the 1st and 2nd track 3a and 3b, and the diode 9 which constitutes the frequency means for switching 6 is connected in parallel to the diode 9 while being connected in series between the 1st and 2nd track 3a and 3b. And with the capacity C1, electromagnetic field coupling of the high frequency signal impressed to the feed electrode 5 from the high frequency signal source f is carried out to the radiation electrode 3, it serves as an electric wave, and is emitted.
[0023]Here, the diode 9 turns on and off by impressing voltage to the diode 9 and adjusting the value of this input voltage from the voltage control mechanism (not shown) of a set side, via the switching electrode 7 which constitutes the frequency means for switching 6 of the surface mounted type antenna 1. At the time of OFF of the diode 9, the 1st thru/or the 3rd track 3a, 3b, and 3c which constitute the radiation electrode 3 flow mutually, and the inductance component of the surface mounted type antenna 1 is formed of the microstrip lines L1 thru/or L3. On the other hand, at the time of one of the diode 9, only the 1st track 3a and 2nd track 3b flow, and the inductance component of the surface mounted type antenna 1 is formed of the microstrip lines L1 and L2. Thus, two or more resonance frequency is realizable by making the diode 9 turn on and off and changing the inductance component which specifies the resonance frequency of an antenna.
[0024]The shape of each electrode provided in the surface of the base 2, each electrode, and arrangement of each chip are not limited to what was shown in above-mentioned working example, unless these each inter-electrode one or the connecting relation of each electrode and each chip is changed. For example, as shown in drawing 3, in 2 d of end faces of the base 2, the placed opposite of the 1st open end three a1 and feed electrode 5 of the track 3a of the radiation electrode 3 may be carried out. As shown in drawing 4, the formation position [in / according to the shape of the 1st track 3a / while making it crooked in the shape of a right angle on the principal surface 2a on the other hand / the feed electrode 5, the switching electrode 7, and the base 2 of the resistance 8] of the base 2 may

be changed for the 1st track 3a of the radiation electrode 3.
[0025]Next, the composition of the surface mounted type antenna concerning the 2nd working example of this invention is explained using drawing 5. The same numerals are given to the portion which is the same as that of the 1st working example, or corresponds, and the explanation is omitted.
[0026]In drawing 5, 21 is a surface mounted type antenna and forms the radiation electrode 23, the earth electrode 24, the feed electrode 25, and the frequency means for switching 26 in the surface of the base 2.
[0027]Here, the radiation electrode 23 consists of the 1st radiation electrode 23a and 2nd radiation electrode 23b. Among these, one end of the 1st radiation electrode 23a formed the open end 23a1 [near / which, on the other hand, touches the end face 2c of the principal surface 2a / the edge of the base 2], and the other end is prolonged to near the approximately center of the edge which, on the other hand, touches 2 f of sides of the principal surface 2a. The placed opposite of the one end is carried out to the other end of the 1st radiation electrode 23a, the 2nd radiation electrode 23b was crooked in the shape of an abbreviated L character in the one side principal surface 2a of the base 2, and the other end is prolonged on the side 2e. The earth electrode 24 consists of the 1st earth electrode 24a and 2nd earth electrode 24b. Among these, one end of the 1st earth electrode 24a approaches the open end 23a1 of the 1st radiation electrode 23a of the base 2 that constitutes the radiation electrode 23 in the principal surface 2a on the other hand, and is arranged, and the other end is prolonged to another side principal surface 2b via the side 2e of the base 2. The 2nd earth electrode 24b was formed in the side 2e of the base 2, one end was connected to the 2nd radiation electrode 23b that constitutes the radiation electrode 23, and the other end is prolonged to another side principal surface 2b of the base 2.
[0028]The feed electrode 25 adjoins from the earth electrode 24 at inner direction slippage of the base 2 at the earth electrode 24, it is formed, one end has been arranged at about 23a1 open end of the radiation electrode 23 of the one side principal surface 2a of the base 2, and the other end is prolonged to another side principal surface 2b via the side 2e.
[0029]The frequency means for switching 26 consists of the switching electrode 27, the resistance 28 for chalk, the variable capacitance diode 29 as a variable capacity element, and the capacitor 30 for DC cut. Among these, the resistance 28, the variable capacitance diode 29, and the capacitor 30 consist of chips, respectively. Elements other than variable capacitance diode may be used as a variable capacity element.
[0030]Here, the switching electrode 27 consisted of the 1st switching electrode 27a and 2nd switching electrode 27b, among these one end of the 1st switching electrode 27a has been arranged in the approximately center of the one side principal surface 2a of the base 2, and the other end is prolonged to another side principal surface 2b via the side 2e of the base 2. It is formed on extension of the 1st switching electrode 27a, the placed opposite of the one end is carried out to one end of the 1st switching electrode 27a, and the 2nd switching electrode 27b is connected to the 1st radiation electrode 23a in which the other end constitutes the radiation electrode 23. The resistance 28 has been arranged between the 1st switching electrode 27a that constitutes the switching electrode 27, and the 2nd switching electrode 27b, and has connected the 1st switching electrode 27a and 2nd switching electrode 27b. The variable capacitance diode 29 has been arranged between the open end 23a1 of the radiation electrode 23, and the end of the 1st earth electrode 24a that constitutes the earth electrode 24, and has connected the radiation electrode 23 and the earth electrode 24. The capacitor 30 has been arranged between the other end of the 1st radiation electrode 23a that constitutes the radiation electrode 23, and one end of the 2nd radiation electrode 23b, and has connected the 1st radiation electrode 23a and 2nd radiation electrode 23b.
[0031]It is mounted in a circuit wiring board, the 1st switching electrode 27a that constitutes the switching electrode 27 is connected to the voltage control mechanism of a set side, and especially the surface mounted type antenna 21 constituted in this way is used, although not illustrated.
[0032]Next, operation of the surface mounted type antenna 21 is explained using drawing 6.
[0033]In drawing 6, f is a high frequency signal source and the capacity which generates C6 between the open end 23a1 of the radiation electrode 23 and the feed electrode 25, and C7 are capacity generated between the open end 23a1 of the radiation electrode 23, and the earth electrode 24. VC is the variable capacity by the variable capacitance diode 29. R2 is resistance by the resistance 28, and C8 is the capacity by the capacitor for a bypass (not shown) formed on the circuit wiring board in which the surface mounted type antenna 21 is mounted. L4 is the inductance by the 1st radiation electrode 23a, and the inductance according [L5] to the 2nd radiation electrode

23b, and C9 is the capacity by the capacitor 30. And with the capacity C6, electromagnetic field coupling of the high frequency signal impressed to the feed electrode 25 from the high frequency signal source f is carried out to the radiation electrode 23, it serves as an electric wave, and is emitted.

[0034]Here, the capacity by the variable capacitance diode 29 fluctuates by impressing voltage to the variable capacitance diode 29, and adjusting the value of this input voltage from the voltage control mechanism of a set side, via the switching electrode 27 which constitutes the frequency means for switching 26 of the surface mounted type antenna 21. Thus, two or more resonance frequency is realizable by changing the capacity component which specifies the resonance frequency of an antenna.

[0035]The shape of each electrode provided in the surface of the base 2, each electrode, and arrangement of each chip are not limited to what was shown in above-mentioned working example, unless these each inter-electrode one or the connecting relation of each electrode and each chip is changed. For example, as shown in drawing 7, while arranging the capacitor 30 on 2 f of sides of the base 2, each electrode may be made to extend on 2 f of sides. As shown in drawing 8, the end face 2c of the base 2 may be detoured, and the 1st radiation electrode 23a may be formed.

[0036]

[Effect of the Invention]A semiconductor device can be made to turn on and off in the surface mounted type antenna concerning this invention by switching the voltage of a predetermined field and being impressed by a semiconductor device from the exterior, via the switching electrode which constitutes a frequency means for switching. And at the time of OFF of a semiconductor device, the 1st thru/or the 3rd track which constitutes a radiation electrode will flow mutually, and only the 1st and 2nd tracks will flow mutually at the time of one of a semiconductor device. Thus, by switching OFF/OFF of a semiconductor device, the linear dimension of the portion actually used among radiation electrodes can be changed, and the inductance component which specifies the resonance frequency of an antenna can be adjusted. Thereby, the surface mounted type antenna which has two or more resonance frequency can be provided.

[0037]In the surface mounted type antenna concerning this invention, the capacity of a variable capacity element can be changed from the exterior by switching the voltage of a predetermined field and being impressed by a variable capacity element via the switching electrode which constitutes a frequency means for switching. The capacity component which specifies the resonance frequency of an antenna can be changed by this, and the surface mounted type antenna which has two or more resonance frequency can be provided.

[0038]In the surface mounted type antenna concerning this invention, since the frequency means for switching is established on the surface of the base, the surface mounted type antenna does not need to establish the frequency means for switching of a different body, and contributes it to the miniaturization of the whole device provided with a surface mounted type antenna.

[Translation done.]

* NOTICES *

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TECHNICAL FIELD

[Field of the Invention]This invention relates to mobile communications equipment, such as a cellular phone, and the surface mounted type antenna used for wireless LAN.

[Translation done.]

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PRIOR ART

[Description of the Prior Art]As a conventional surface mounted type antenna, what was indicated by JP,H9-98015,A is taken for an example, and the composition is explained using drawing 9.
[0003]In drawing 9, 41 is a surface mounted type antenna and it comes to form the radiation electrode 43, the earth electrode 44, and the feed electrode 45 which consist of microstrip lines in the surface of the base 42 which consists of a dielectric or a magnetic body. Here, one end of the radiation electrode 43 is connected to the earth electrode 44 of the base 42 which, on the other hand, formed the open end 43a in the principal surface 42a, and the other end was prolonged in the another side principal surface 42b of the base 42, and was formed in the field. In the one side principal surface 42a of the base 42, the end of the feed electrode 45 approaches the open end 43a of the radiation electrode 43, and is arranged. The other end of the feed electrode 45 is prolonged in the another side principal surface 42b of the base 42, and is electrically insulated from the earth electrode 44 by being arranged via the base of the base 42 to the earth electrode 44. Next, operation of the surface mounted type antenna 41 constituted in this way is explained using drawing 10.
[0004]In drawing 10, the capacity which generates f1 in a high frequency signal source, and generates C10 between the open end 43a of the radiation electrode 43 and the feed electrode 45, the microstrip line from which L6 constitutes the radiation electrode 43, and R3 are radiation resistance. Here, with the capacity C10, electromagnetic field coupling of the high frequency signal impressed to the feed electrode 45 from the high frequency signal source f1 is carried out to the radiation electrode 43, it serves as an electric wave, and is emitted.

[Translation done.]

EFFECT OF THE INVENTION

[Effect of the Invention]A semiconductor device can be made to turn on and off in the surface mounted type antenna concerning this invention by switching the voltage of a predetermined field and being impressed by a semiconductor device from the exterior, via the switching electrode which constitutes a frequency means for switching. And at the time of OFF of a semiconductor device, the 1st thru/or the 3rd track which constitutes a radiation electrode will flow mutually, and only the 1st and 2nd tracks will flow mutually at the time of one of a semiconductor device. Thus, by switching OFF/OFF of a semiconductor device, the linear dimension of the portion actually used among radiation electrodes can be changed, and the inductance component which specifies the resonance frequency of an antenna can be adjusted. Thereby, the surface mounted type antenna which has two or more resonance frequency can be provided.
[0037]In the surface mounted type antenna concerning this invention, the capacity of a variable capacity element can be changed from the exterior by switching the voltage of a predetermined field and being impressed by a variable capacity element via the switching electrode which constitutes a frequency means for switching. The capacity component which specifies the resonance frequency of an antenna can be changed by this, and the surface mounted type antenna which has two or more resonance frequency can be provided.
[0038]In the surface mounted type antenna concerning this invention, since the frequency means for switching is established on the surface of the base, the surface mounted type antenna does not need to establish the frequency means for switching of a different body, and contributes it to the miniaturization of the whole device provided with a surface mounted type antenna.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]However, in the conventional surface mounted type antenna 41, since resonance frequency was specified mainly with the linear dimension and width dimension of the dielectric constant of the dielectric or magnetic body which constitutes the base 42, and the radiation electrode 43, there was a problem that two or more resonance frequency was not obtained.

[0006]Then, it aims at providing the surface mounted type antenna with which two or more resonance frequency is obtained in this invention.

[Translation done.]

MEANS

[Means for Solving the Problem]In [in order to attain the above-mentioned purpose] this invention, Have a radiation electrode, an earth electrode, and a feed electrode which are provided in the surface of a base which consists of a dielectric or a magnetic body, and this base, one end of said radiation electrode forms an open end, and it is connected to said earth electrode by the other end, and An open end of said radiation electrode, A frequency means for switching for an end of said feed electrode to change an inductance component or a capacity component, and switch resonance frequency on the surface of said base, in a surface mounted type antenna which it comes to arrange by approaching mutually, was established.

[0008]Said radiation electrode comprises the 1st track, the 2nd track, and the 3rd track where said base this invention consists of a microstrip line provided in the principal surface on the other hand, an end of said 1st track forms an open end, and it is characterized by an end of said 2nd track comprising the following.

It is arranged near the other end of said 1st track, and said 3rd track, A semiconductor device which it is formed in one succeeding said 2nd track, said earth electrode is provided in the another side principal surface of said base, and said frequency means for switching becomes from a chip connected to the other end of said 1st track, and one end of said 2nd track.

A switching electrode for switching and impressing voltage of a predetermined field to this semiconductor device.

[0009]Said radiation electrode consists of striplines and said earth electrode, The 1st this invention mutually formed in a different body consists of an earth electrode and the 2nd earth electrode, an end of said 1st earth electrode approaches an open end of said radiation electrode, and is arranged, and it is characterized by said 2nd earth electrode comprising the following.

A variable capacity element which it is formed in one succeeding said some of radiation electrodes, and said frequency means for switching becomes from a chip connected to an open end of said 1st earth electrode and said radiation electrode.

A switching electrode for switching and impressing voltage of a predetermined field to this variable capacity element.

[0010]A semiconductor device can be made to turn on and off in a surface mounted type antenna concerning this invention by switching voltage of a predetermined field and being impressed by a semiconductor device from the exterior, via a switching electrode which constitutes a frequency means for switching. And at the time of OFF of a semiconductor device, the 1st thru/or the 3rd track which constitutes a radiation electrode will flow mutually, and only the 1st and 2nd tracks will flow mutually at the time of one of a semiconductor device. Thus, by switching OFF/OFF of a semiconductor device, a linear dimension of a portion actually used among radiation electrodes can be changed, and an inductance component which specifies resonance frequency of an antenna can be adjusted. Thereby, two or more resonance frequency is realizable.

[0011]In a surface mounted type antenna concerning this invention, capacity of a variable capacity element can be changed from the exterior by switching voltage of a predetermined field and being impressed by a variable capacity element via a switching electrode which constitutes a frequency means for switching. A capacity component which specifies resonance frequency of an antenna can be changed by this, and two or more resonance frequency can be

realized.
[0012]In a surface mounted type antenna concerning this invention, since a frequency means for switching is established on the surface of a base, the surface mounted type antenna does not need to establish a frequency means for switching of a different body, and contributes it to a miniaturization of the whole device provided with a surface mounted type antenna.
[0013]
[Embodiment of the Invention]The composition of the surface mounted type antenna concerning the 1st working example of this invention is explained using drawing 1.
[0014]In drawing 1, 1 is a surface mounted type antenna and forms the radiation electrode 3, the earth electrode 4, the feed electrode 5, and the frequency means for switching 6 in the surface of the base 2 which fabricates dielectrics, such as Ceramics Sub-Division and resin, to rectangular parallelepiped shape. The base 2 may consist of a magnetic body instead of a dielectric.
[0015]Here, the radiation electrode 3 comprises the 1st track 3a, the 2nd track 3b, and the 3rd track 3c which consist of a microstrip line of the base 2 mutually formed in a different body on the other hand in the principal surface 2a. Among these, one end of the 1st track 3a forms the open end three a1, and the extended part three a2 of the base 2 prolonged in the approximately center of the principal surface 2a on the other hand is formed in the other end. The 2nd track 3b is arranged on extension of the 1st track 3a, and one end is close to the other end of the 1st track 3a. The other end of the 2nd track 3b is prolonged in another side principal surface 2b via the end face 2c of the base 2. The 3rd track 3c has the extended part 3c1, and is formed in the 2nd track 3b and one in succession near the end of the 2nd track 3b via this extended part 3c1.
[0016]The earth electrode 4 is formed all over almost [of another side principal surface 2b of the base 2], and is formed in the 2nd track 3b and one succeeding the other end of the 2nd track 3b of the radiation electrode 3.
[0017]The feed electrode 5 covers the one side principal surface 2a, 2d of end faces, and another side principal surface 2b of the base 2, and is formed in roughly U-shape. The end of the feed electrode 5 is close to the open end three a1 of the radiation electrode 3 in the one side principal surface 2a of the base 2. The other end is electrically insulated from the earth electrode 4 by being arranged via the base of the base 2 to the earth electrode 4 in another side principal surface 2b of the base 2.
[0018]The frequency means for switching 6 consists of the switching electrode 7, the resistance 8 for chalk, the diode 9 as a semiconductor device, and the capacitor 10 for a bypass. Among these, the resistance 8, the diode 9, and the capacitor 10 consist of chips, respectively. Elements, such as a transistor or FET, may be used as a semiconductor device in addition to a diode.
[0019]Here, the switching electrode 7 is electrically insulated from the earth electrode 4 by [of the base 2] resulting in another side principal surface 2b via the side 2e of the base 2, and on the other hand, being arranged via the base of the base 2 to the earth electrode 4 from about three a1 open end of the radiation electrode 3 on the principal surface 2a. The resistance 8 has been arranged between the switching electrodes 7 the open end three a1 side of the 1st track 3a of the radiation electrode 3, and has connected the 1st track 3a and switching electrode 7. The diode 9 has been arranged between the 1st and 2nd track 3a that constitutes the radiation electrode 3, and 3b, and has connected these two tracks. The capacitor 10 has been arranged between the extended part three a2 of the 1st track 3a, and the 3rd track 3c, and has connected these two tracks.
[0020]It is mounted in a circuit wiring board, the switching electrode 7 is connected to the voltage control mechanism of a set side, and especially the surface mounted type antenna 1 constituted in this way is used, although not illustrated.
[0021]Next, operation of the surface mounted type antenna 1 is explained using drawing 2.
[0022]In drawing 2, f is a high frequency signal source and the capacity which generates C1 between the open end three a1 of the radiation electrode 3 and the feed electrode 5, the capacity which generates C2 between the earth electrode 4 and the feed electrode 5, and C3 are capacity generated between the open end three a1 of the 1st track 3a of the radiation electrode 3, and the earth electrode 4. R1 is resistance by the resistance 8, and C4 is the capacity by the capacitor for a bypass (not shown) formed on the circuit wiring board in which the surface mounted type antenna 1 is mounted. L1, L2, and L3 are microstrip lines which constitute the 1st thru/or the 3rd track 3a, 3b, and 3c, respectively, and C5 is the capacity by the capacitor 10. The 3rd track 3c is connected between the 1st and

2nd track 3a and 3b, and the diode 9 which constitutes the frequency means for switching 6 is connected in parallel to the diode 9 while being connected in series between the 1st and 2nd track 3a and 3b. And with the capacity C1, electromagnetic field coupling of the high frequency signal impressed to the feed electrode 5 from the high frequency signal source f is carried out to the radiation electrode 3, it serves as an electrio wave, and is emitted.
[0023]Here, the diode 9 turns on and off by impressing voltage to the diode 9 and adjusting the value of this input voltage from the voltage control mechanism (not shown) of a set side, via the switching electrode 7 which constitutes the frequency means for switching 6 of the surface mounted type antenna 1. At the time of OFF of the diode 9, the 1st thru/or the 3rd track 3a, 3b, and 3c which constitute the radiation electrode 3 flow mutually, and the inductance component of the surface mounted type antenna 1 is formed of the microstrip lines L1 thru/or L3. On the other hand, at the time of one of the diode 9, only the 1st track 3a and 2nd track 3b flow, and the inductance component of the surface mounted type antenna 1 is formed of the microstrip lines L1 and L2. Thus, two or more resonance frequency is realizable by making the diode 9 turn on and off and changing the inductance component which specifies the resonance frequency of an antenna.
[0024]The shape of each electrode provided in the surface of the base 2, each electrode, and arrangement of each chip are not limited to what was shown in above-mentioned working example, unless these each inter-electrode one or the connecting relation of each electrode and each chip is changed. For example, as shown in drawing 3, in 2 d of end faces of the base 2, the placed opposite of the 1st open end three a1 and feed electrode 5 of the track 3a of the radiation electrode 3 may be carried out. As shown in drawing 4, the formation position [in / according to the shape of the 1st track 3a / while making it crooked in the shape of a right angle on the principal surface 2a on the other hand / the feed electrode 5, the switching electrode 7, and the base 2 of the resistance 8] of the base 2 may be changed for the 1st track 3a of the radiation electrode 3.
[0025]Next, the composition of the surface mounted type antenna concerning the 2nd working example of this invention is explained using drawing 5. The same numerals are given to the portion which is the same as that of the 1st working example, or corresponds, and the explanation is omitted.
[0026]In drawing 5, 21 is a surface mounted type antenna and forms the radiation electrode 23, the earth electrode 24, the feed electrode 25, and the frequency means for switching 26 in the surface of the base 2.
[0027]Here, the radiation electrode 23 consists of the 1st radiation electrode 23a and 2nd radiation electrode 23b. Among these, one end of the 1st radiation electrode 23a formed the open end 23a1 [near / which, on the other hand, touches the end face 2c of the principal surface 2a / the edge of the base 2], and the other end is prolonged to near the approximately center of the edge which, on the other hand, touches 2 f of sides of the principal surface 2a. The placed opposite of the one end is carried out to the other end of the 1st radiation electrode 23a, the 2nd radiation electrode 23b was crooked in the shape of an abbreviated L character in the one side principal surface 2a of the base 2, and the other end is prolonged on the side 2e. The earth electrode 24 consists of the 1st earth electrode 24a and 2nd earth electrode 24b. Among these, one end of the 1st earth electrode 24a approaches the open end 23a1 of the 1st radiation electrode 23a of the base 2 that constitutes the radiation electrode 23 in the principal surface 2a on the other hand, and is arranged, and the other end is prolonged to another side principal surface 2b via the side 2e of the base 2. The 2nd earth electrode 24b was formed in the side 2e of the base 2, one end was connected to the 2nd radiation electrode 23b that constitutes the radiation electrode 23, and the other end is prolonged to another side principal surface 2b of the base 2.
[0028]The feed electrode 25 adjoins from the earth electrode 24 at inner direction slippage of the base 2 at the earth electrode 24, it is formed, one end has been arranged at about 23a1 open end of the radiation electrode 23 of the one side principal surface 2a of the base 2, and the other end is prolonged to another side principal surface 2b via the side 2e.
[0029]The frequency means for switching 26 consists of the switching electrode 27, the resistance 28 for chalk, the variable capacitance diode 29 as a variable capacity element, and the capacitor 30 for DC cut. Among these, the resistance 28, the variable capacitance diode 29, and the capacitor 30 consist of chips, respectively. Elements other than variable capacitance diode may be used as a variable capacity element.
[0030]Here, the switching electrode 27 consisted of the 1st switching electrode 27a and 2nd switching electrode 27b, among these one end of the 1st switching electrode 27a has been arranged in the approximately center of the one side principal surface 2a of the base 2, and the other end is prolonged to another side principal surface 2b via

the side 2e of the base 2. It is formed on extension of the 1st switching electrode 27a, the placed opposite of the one end is carried out to one end of the 1st switching electrode 27a, and the 2nd switching electrode 27b is connected to the 1st radiation electrode 23a in which the other end constitutes the radiation electrode 23. The resistance 28 has been arranged between the 1st switching electrode 27a that constitutes the switching electrode 27, and the 2nd switching electrode 27b, and has connected the 1st switching electrode 27a and 2nd switching electrode 27b. The variable capacitance diode 29 has been arranged between the open end 23a1 of the radiation electrode 23, and the end of the 1st earth electrode 24a that constitutes the earth electrode 24, and has connected the radiation electrode 23 and the earth electrode 24. The capacitor 30 has been arranged between the other end of the 1st radiation electrode 23a that constitutes the radiation electrode 23, and one end of the 2nd radiation electrode 23b, and has connected the 1st radiation electrode 23a and 2nd radiation electrode 23b.

[0031]It is mounted in a circuit wiring board, the 1st switching electrode 27a that constitutes the switching electrode 27 is connected to the voltage control mechanism of a set side, and especially the surface mounted type antenna 21 constituted in this way is used, although not illustrated.

[0032]Next, operation of the surface mounted type antenna 21 is explained using drawing 6.

[0033]In drawing 6, f is a high frequency signal source and the capacity which generates C6 between the open end 23a1 of the radiation electrode 23 and the feed electrode 25, and C7 are capacity generated between the open end 23a1 of the radiation electrode 23, and the earth electrode 24. VC is the variable capacity by the variable capacitance diode 29. R2 is resistance by the resistance 28, and C8 is the capacity by the capacitor for a bypass (not shown) formed on the circuit wiring board in which the surface mounted type antenna 21 is mounted. L4 is the inductance by the 1st radiation electrode 23a, and the inductance according [L5] to the 2nd radiation electrode 23b, and C9 is the capacity by the capacitor 30. And with the capacity C6, electromagnetic field coupling of the high frequency signal impressed to the feed electrode 25 from the high frequency signal source f is carried out to the radiation electrode 23, it serves as an electric wave, and is emitted.

[0034]Here, the capacity by the variable capacitance diode 29 fluctuates by impressing voltage to the variable capacitance diode 29, and adjusting the value of this input voltage from the voltage control mechanism of a set side, via the switching electrode 27 which constitutes the frequency means for switching 26 of the surface mounted type antenna 21. Thus, two or more resonance frequency is realizable by changing the capacity component which specifies the resonance frequency of an antenna.

[0035]The shape of each electrode provided in the surface of the base 2, each electrode, and arrangement of each chip are not limited to what was shown in above-mentioned working example, unless these each inter-electrode one or the connecting relation of each electrode and each chip is changed. For example, as shown in drawing 7, while arranging the capacitor 30 on 2 f of sides of the base 2, each electrode may be made to extend on 2 f of sides. As shown in drawing 8, the end face 2c of the base 2 may be detoured, and the 1st radiation electrode 23a may be formed.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

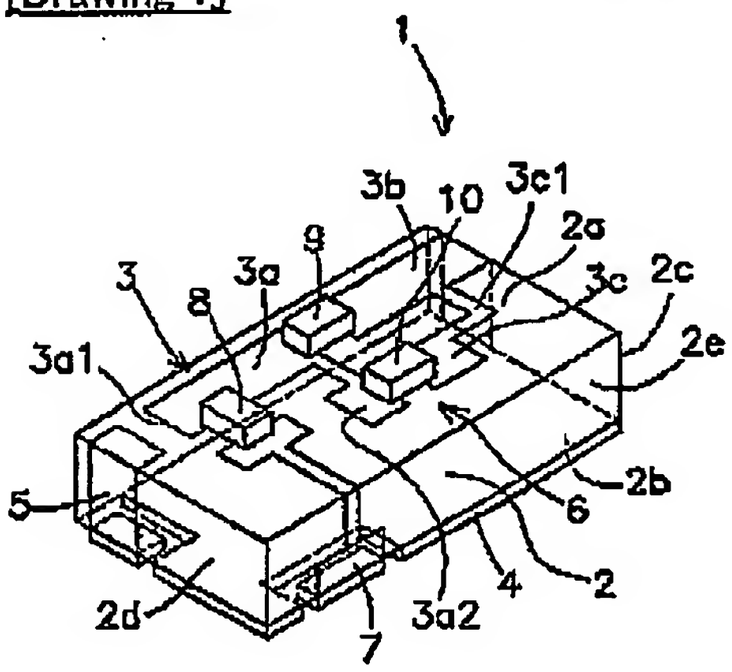
DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a fluoroscopy perspective view showing the surface mounted type antenna concerning the 1st working example of this invention.
[Drawing 2]It is a representative circuit schematic of the surface mounted type antenna of drawing 1.
[Drawing 3]It is an important section perspective view showing the modification of the surface mounted type antenna of drawing 1.
[Drawing 4]It is an important section perspective view showing other modifications of the surface mounted type antenna of drawing 1.
[Drawing 5]It is a fluoroscopy perspective view showing the surface mounted type antenna concerning the 2nd working example of this invention.
[Drawing 6]It is a representative circuit schematic of the surface mounted type antenna of drawing 5.
[Drawing 7]It is a perspective view showing the modification of the surface mounted type antenna of drawing 5.
[Drawing 8]It is an important section perspective view showing other modifications of the surface mounted type antenna of drawing 5.
[Drawing 9]It is a fluoroscopy perspective view showing the conventional surface mounted type antenna.
[Drawing 10]It is a representative circuit schematic of the surface mounted type antenna of drawing 9.
[Description of Notations]
1, 21 surface mounted type antennas
2 Base
2a On the other hand, it is the principal surface.
2b Another side principal surface
3 and 23 Radiation electrode
3a The 1st track
3b The 2nd track
3c The 3rd track
Three a1 and 23a1 Open end
4 and 24 Earth electrode
24a The 1st earth electrode
24b The 2nd earth electrode
5 and 25 Feed electrode
6 and 26 Frequency means for switching
7 and 27 Switching electrode
9 Diode (semiconductor device)
29 Variable capacitance diode (variable capacity element)

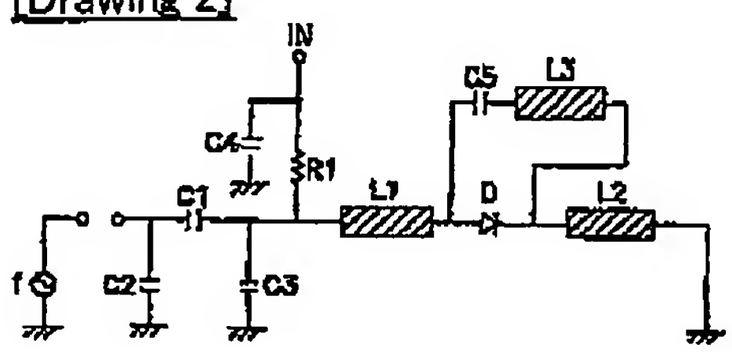
[Translation done.]

DRAWINGS

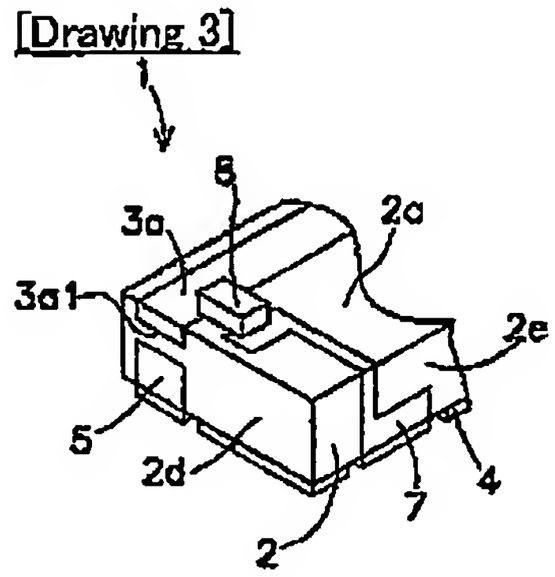
[Drawing 1]



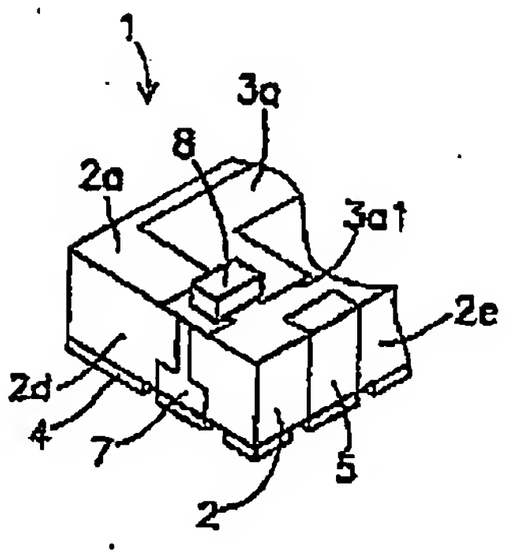
[Drawing 2]



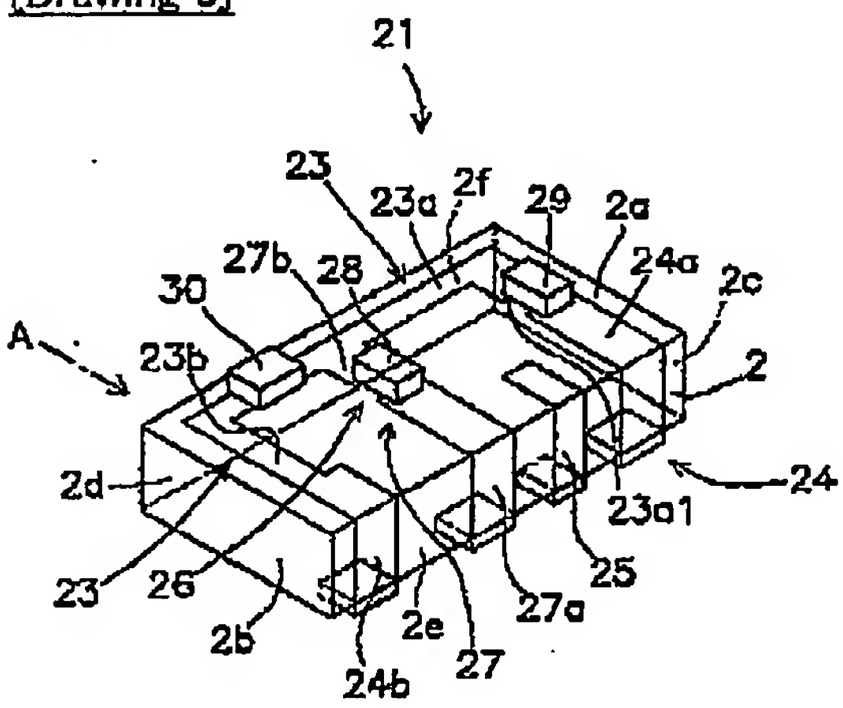
[Drawing 3]



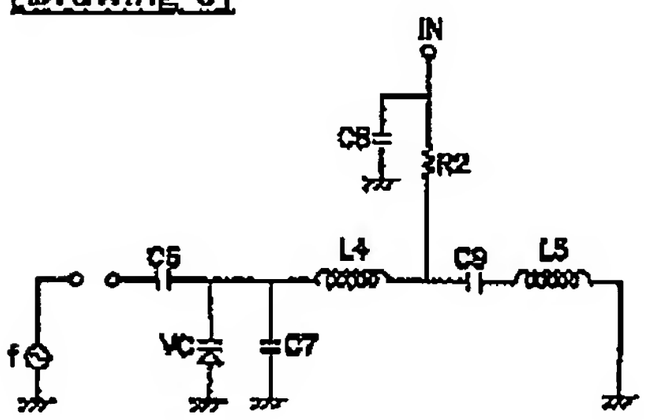
[Drawing 4]



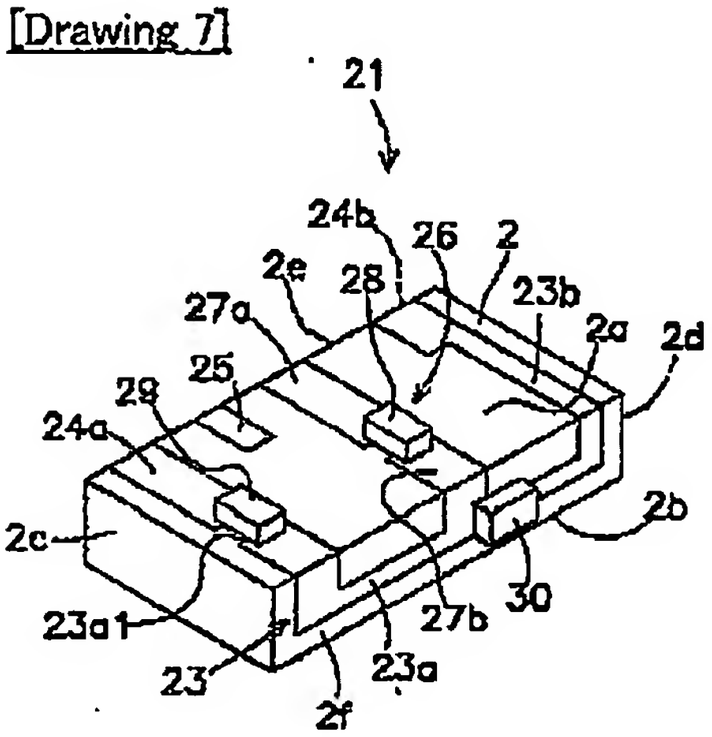
[Drawing 5]



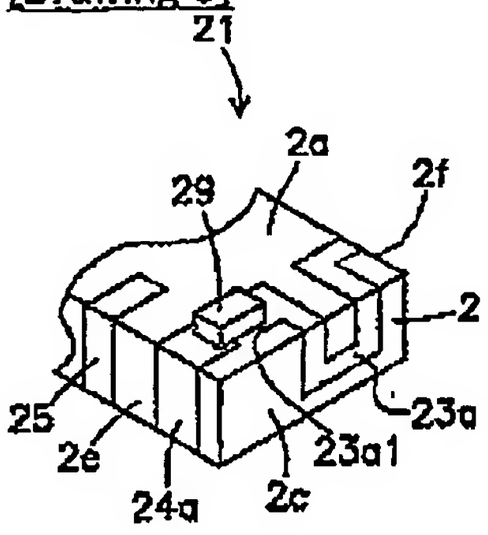
[Drawing 6]



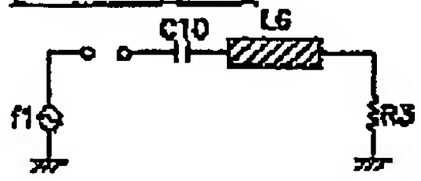
[Drawing 7]



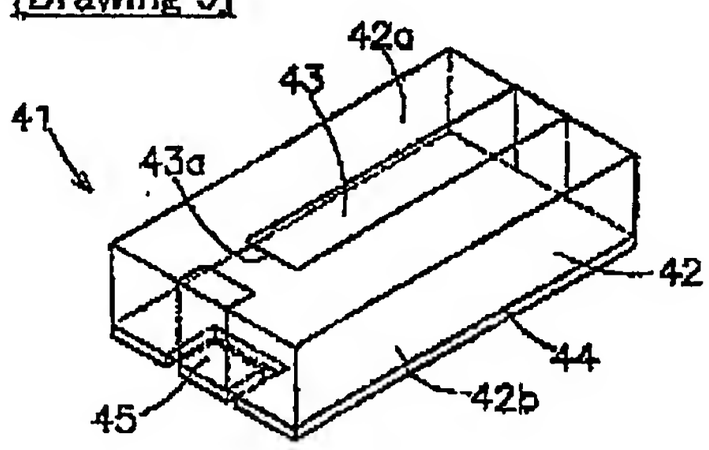
[Drawing 8]



[Drawing 10]



[Drawing 9]



[Translation done.]